BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

PATENT SPECIFICATION

242,818

Application Date: Jan. 1, 1925. No. 77/25.

Complete Accepted: Nov. 19, 1925.

COMPLETE SPECIFICATION.

Method of and Apparatus for Cleaning the Tubes and other Parts of Boilers.

I, WALLACE CRANSTON FAIRWEATHER, of 29, St. Vincent Place, Glasgow, and 65, 66, Chancery Lane, London, W.C. 2, Chartered Patent Agent, of British nationality, do hereby declare the nature of this invention (a communication from Whittemore, Hulbert, Whittemore and Belknap, of Suite 112, Penobscot Building, Detroit, Michigan, United States of America, a partnership each member of which is a citizen of the United States of America), and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention relates to a boiler cleaner of the type incorporating a blower unit including a reciprocable oscillatory blower head carried by a hollow spindle, being normally stationary within a housing but adapted to be projected across the face of the tube sheet by the action of the cleaning fluid, the blower head carrying a nozzle operatively connected to an internal shaft journalled within the hollow spindle and angularly movable with respect to the blower head whereby the tubes are subjected successively to the influence of the cleaning fluid.

An object of the invention is to provide a boiler cleaner of this type whereby the cleaning fluid is made to trace substantially parallel spaced paths on the tube sheet.

The invention consists in a boiler cleaner of the type described having a blower head and a nozzle through which the cleaning fluid is discharged, including a housing, a rock shaft extending into the housing, a hollow spindle geared to said rock shaft and carrying the blower head, an internal shaft journalled in the hollow spindle and geared to the nozzle, a ratchet wheel on the internal shaft, a pawl movable with the hollow spindle for rotating the ratchet wheel in one direction, and a detent device frictionally connected to the internal shaft permitting limited reverse movement of the ratchet wheel and internal shaft with the hollow spindle and thereafter retaining the ratchet wheel and the internal shaft from further movement in this reverse direction, whereby on futher movement of the hollow spindle angular movement of the nozzle relatively to the blower head is ensured.

In the accompanying drawings:—

Figure 1 is a top plan view partly in section showing the blowers applied to a locomotive boiler;

Figure 2 is a side elevation thereof;

Figure 3 is a sectional view showing a blower in inoperative retracted position;

Figure 4 is a view along the line 4—4 of Figure 3;

Figure 5 is a view correspouding to Figure 3 showing the blower in projected operative position.

Referring to Figure 1 of the drawings, 10 indicates a locomotive boiler having the cab 11, boiler tubes 12 and boiler tube sheet 13. For cleaning these tubes there are located at the sides of the boiler, preferably extending through the water legs 14, a pair of blowers 15. These blowers are located a suitable distance from the tube sheet 13 with their nozzles 16 directed toward the tube sheet. Each blower has a connection with a steam supply by a pipe 17, the steam supply being controlled by valves 18 conveniently located preferably in the cab. The operating rods 19 are formed with suitable handle portions 20 and are operably connected with the blowers as hereinafter set forth.

Referring to Figure 3, the rock arm 21

is adapted to be reciprocated on the pivot shaft 22 by the operating rod 19 and handle 20. The forward end of the shaft 22 carries the pinion 23 keyed to the shaft and meshing with the broad face gear 24 carried within the housing 25. The housing 25 is provided with a forward part 26 which is fixed within the sleeve 27 in the water leg 14. The housing also has a wall 28 providing a bearing for the hollow rod 29 the rear end of which carries the gear 24. The forward end of rod 29 carries the blower head 30 on which is mounted the nozzle 31 formed with the bevel gear 32. The bevel gear 33 meshes with the gear 32 and is carried by the shaft 34 housed within the hollow rod 29. Keyed to the rear end of the shaft 34 is the pawl wheel 35 engaged by the pawl 36 pivotally mounted on the face of the gear 24. The shaft 34 frictionally carries the segment 37 upon which is mounted the pawl 38 also engaging the wheel 35. The housing 25 is provided with the slot 39 and in the slot the heads of the set screws 40 and 40^1 are adapted to operate. The set screws may be located in any of the openings 41 in the segment 37 so as to limit the movement of the latter and vary the increment of advance of the blower nozzle, as will be later apparent.

The spring 42 bears at its forward end against the stationary wall 28 and at its rear end acts upon the spacing sleeve 43 and thrust bearing 44 so as normally to retract the parts to the position shown in Figure 3. Between the part 26 and sleeve 27 air passages 27^1 are provided to afford air circulation to cool the blower.

The blower head 30 is provided at the forward end with a projecting heat-resisting cap 45 which is removable from the blower head. When the blower is not in use, this cap practically seals the end of water leg sleeve 27. The blower head is also provided with steam ports 46 and relief ports 47, the latter communicating with a passage 48, ports 49 and chamber 50. The plunger 51 is carried by the blower head 30.

With the parts in position shown in Figure 3, the operation is as follows:— Steam is admitted through the pipe 17 to the chamber 52 around the plunger 51 to the chamber 53, through the ports 46 to the nozzle 31. The nozzle and ports restrict the flow of the steam so that the [illegible] position indicated in Figure 5. In this position the spacing sleeve contacts with the wall 28 to limit the outward movement of the parts. The outward movement of the blower head 30 carries with it the rod 29 and shaft 34 with the wheel 35, pawls 36 and 38, segment 37 and gear 24.

Steam escaping past the rod 29 and into the chamber 50 will pass through the ports 49, passage 48 and outlet ports 47.

With the parts of the blower in the projected position the rock arm 21 is reciprocated to oscillate the pinion 23 and gear 24. When the rod is moved to rock the gear 24 to the left or counter clockwise, as shown in Figure 4, the pawl 36 will rotate the wheel 35. During this rotation the segment 37, which is frictionally carried on the shaft 34, also swings counter clockwise until the set screw 40 contacts with the wall of the slot 39 adjacent thereto.

Throughout the remaining stroke of the rock arm 21 the pawl 38 permits the rotation of rod 34 and wheel 35 by the pawl 36. Thus, it will be noted that the blower head has been rocked with the nozzle without relative movement therebetween, the nozzle 31 directing its jet of steam for the vertical height of the tube sheet.

When the rock arm 21 is operated to rotate the gear 24 in the opposite direction or clockwise as shown in Figure 4, the frictional resistance in the parts, such as at the gears 32, 33, will rotate the rod 34, segment 37 and wheel 35 all together until further rotation of the segment is prevented by reason of the set screw 40^1 contacting with the wall of the slot 39 adjacent thereto. For the remaining movement of the rock arm 21 the pawl 38 prevents further rotation of the wheel 35 and shaft 34 and the gear 24 rotates the rod 29. During this remaining movement, therefore, the rod 29 will be rotated with respect to the rod 34 to act through the bevel gears 32, 33 to change the direction of the nozzle 31. By locating the set screws 40, 40^1 in the various openings 41 the increment of advance of the nozzle may be varied. The parts are then in position for the next cycle which will include first tracing a vertical path by the blower jet on the tube sheet substantially parallel with the preceding and spaced therefrom a distance determined by the relative movement between the gears 32, 33.

As the steam jets of the pair of blowers continue to sweep the face of the tube sheet vertically the change in direction of the nozzle discharge is in both [illegible] until it reaches the centre where the continued revolving of the nozzle brings it back to its orignal position. The nozzle thus has the combined movements imparted by the oscillation of rod 29 and

the substantially horizontal movement of the nozzle with respect to the tube sheet.

While it is preferred to use steam as the cleaning medium, other fluids such as air, etc., could be used.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A boiler cleaner of the type described having a blower head and a nozzle through which the cleaning fluid is discharged, including a housing, a rock shaft extending into the housing, a hollow spindle geared to said rock shaft and carrying the blower head, an internal shaft journalled in the hollow spindle and geared to the nozzle, a ratchet wheel on the internal shaft, a pawl movable with the hollow spindle for rotating the ratchet wheel in one direction, and a detent device frictionally connected to the internal shaft permitting limited reverse movement of the ratchet wheel and internal shaft with the hollow spindle and thereafter retaining the ratchet wheel and the internal shaft from further movement in this reverse direction whereby on further movement of the hollow spindle angular movement of the nozzle relatively to the blower head is ensured.

2. A boiler cleaner as claimed in Claim 1 including a pinion carried by the rock shaft and meshing with a broad-faced pinion on the hollow spindle, the latter being reciprocably mounted in the housing parallel with the rock shaft, the nozzle being angularly disposed in relation to the blower head and rotatably mounted thereon, the nozzle being formed with gear-teeth on its inner end face meshing with a bevel pinion secured to the forward end of the internal shaft, the pawl being pivotally mounted on the rear end of said broad faced gear, the detent being carried by a lever frictionally mounted on the internal shaft and also carrying a pin or pins engageable with stops on the wall of said housing so positioned as to limit movement of the lever in either direction whereby relative angular movement between the internal shaft and the hollow spindle and therefore between the nozzle and the blower head takes place once in each complete oscillatory cycle of the blower head.

3. A boiler cleaner as claimed in Claim 1 with a heat resisting cap removably secured to the blower head.

4. A boiler cleaner as claimed in Claim 1 having means within the housing for conducting cleaning fluid leakage to a point outside the housing.

5. A boiler cleaner as claimed in Claim 1 in which the nozzle is moved to trace substantially parallel spaced paths across the tube sheet.

6. The boiler cleaner substantially as hereinbefore described, with reference to the accompanying drawings.

Dated this 1st day of January, 1925.

CRUIKSHANK & FAIRWEATHER,
65/66, Chancery Lane, London, W.C. 2,
and
29, Saint Vincent Place, Glasgow,
Agents for the Applicant.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1925.

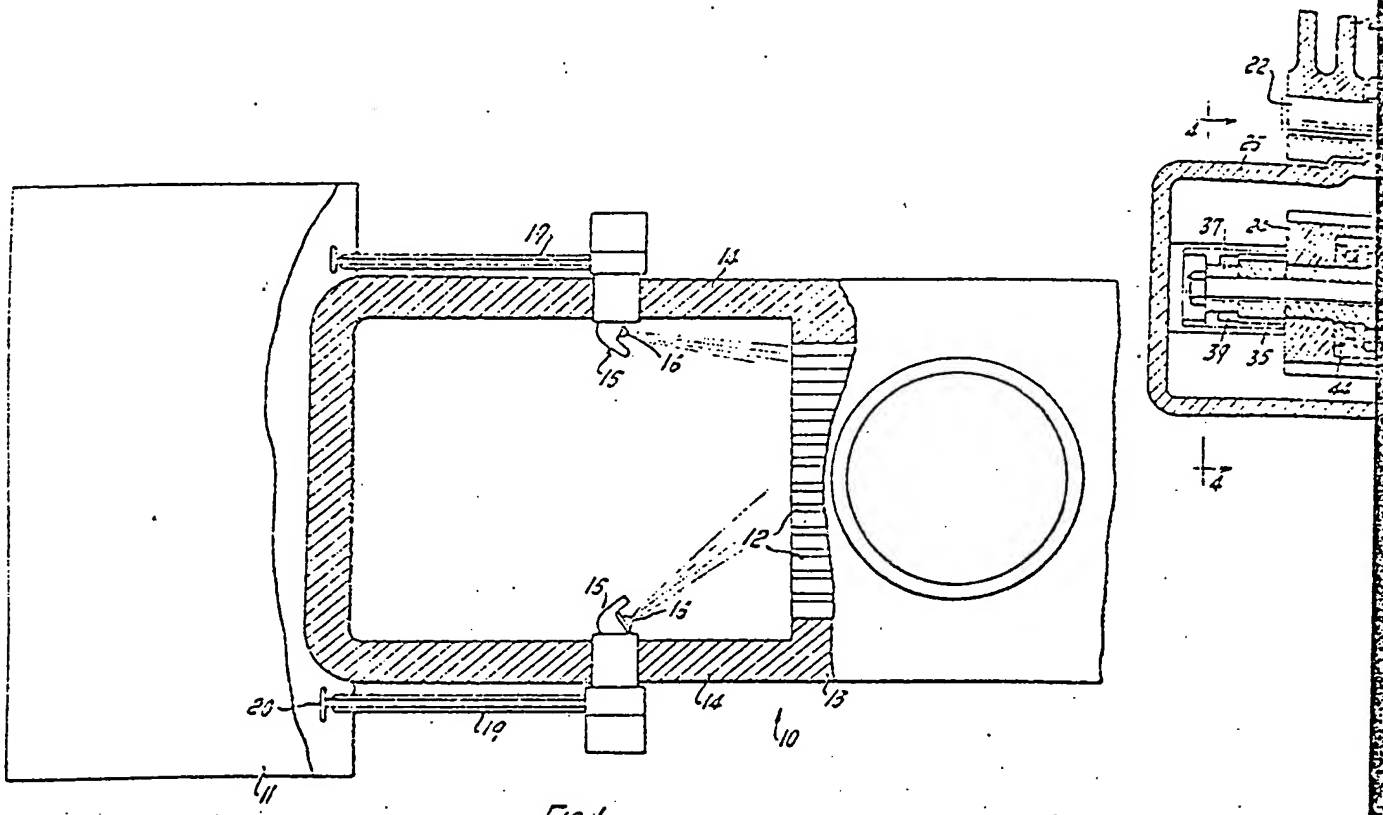

FIG. 1.

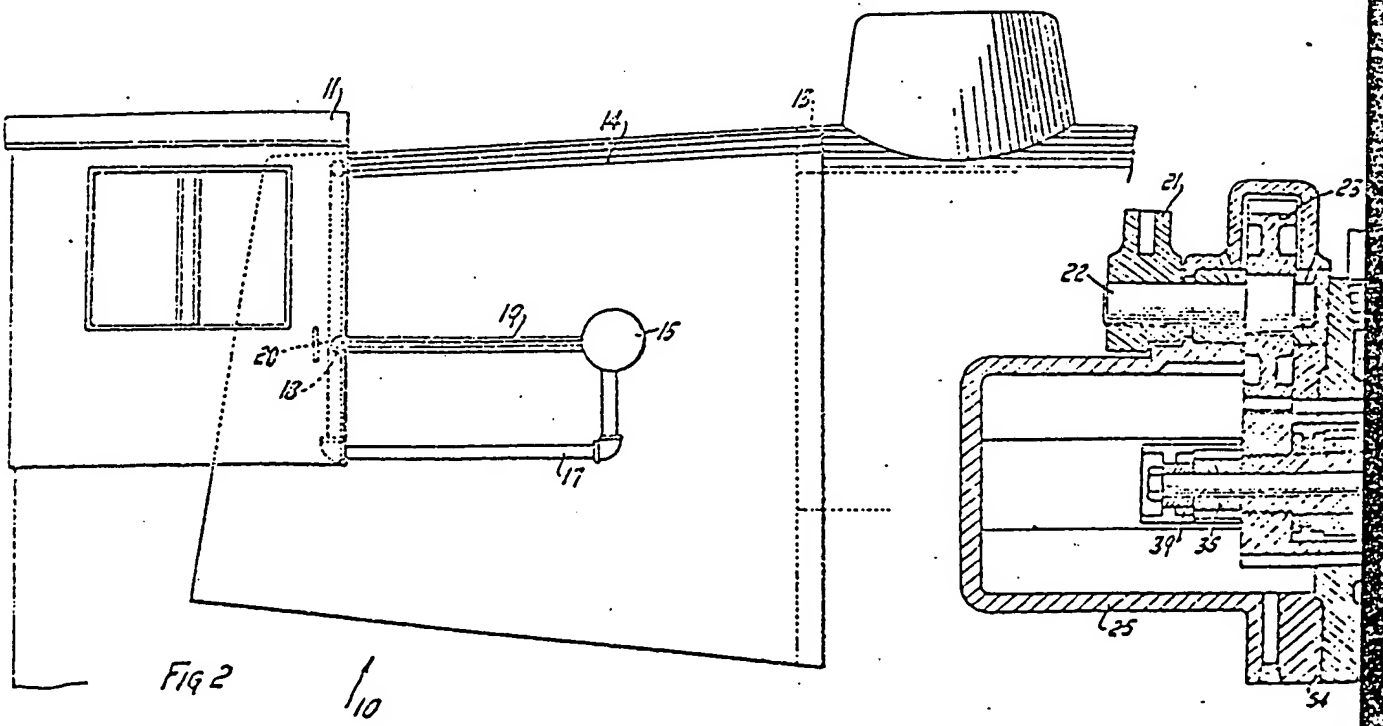

FIG 2

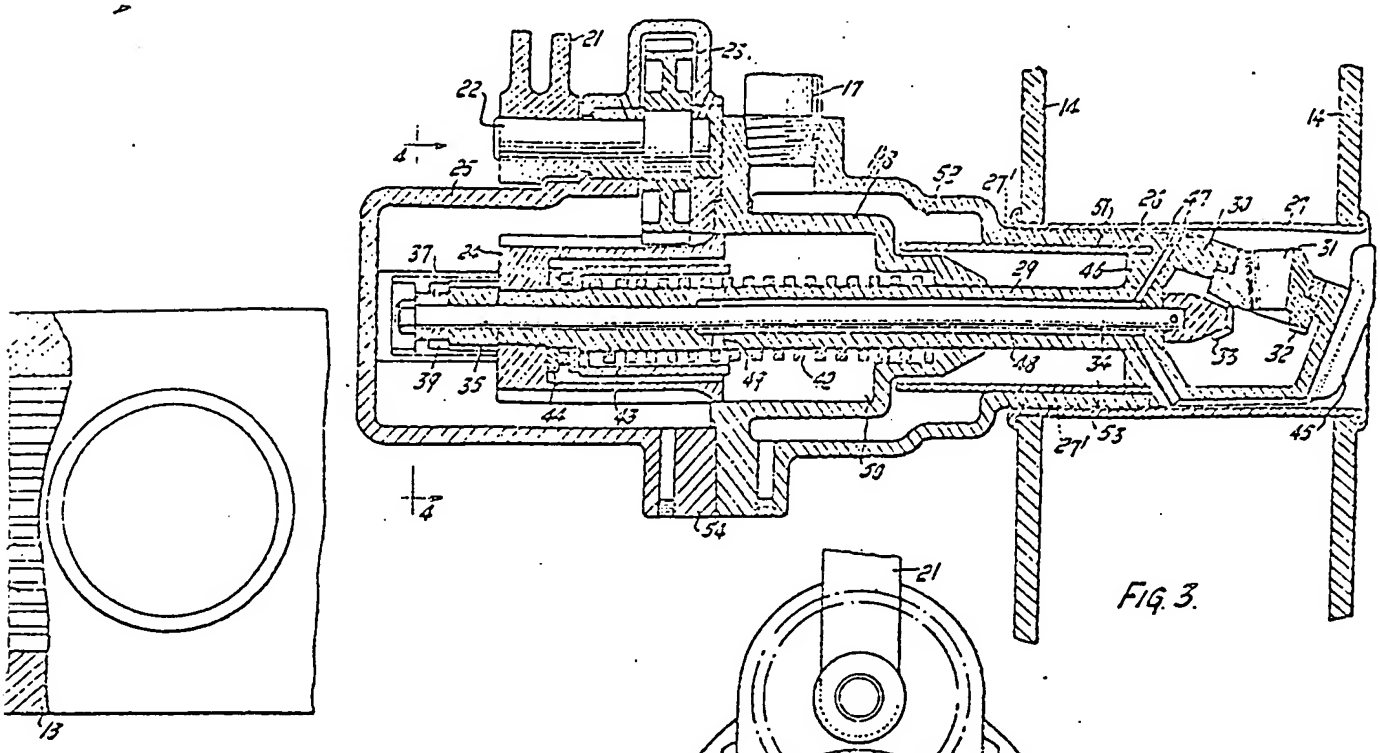

FIG. 3.

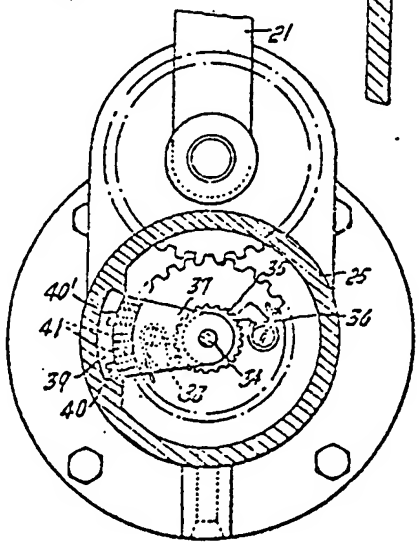

FIG. 4.

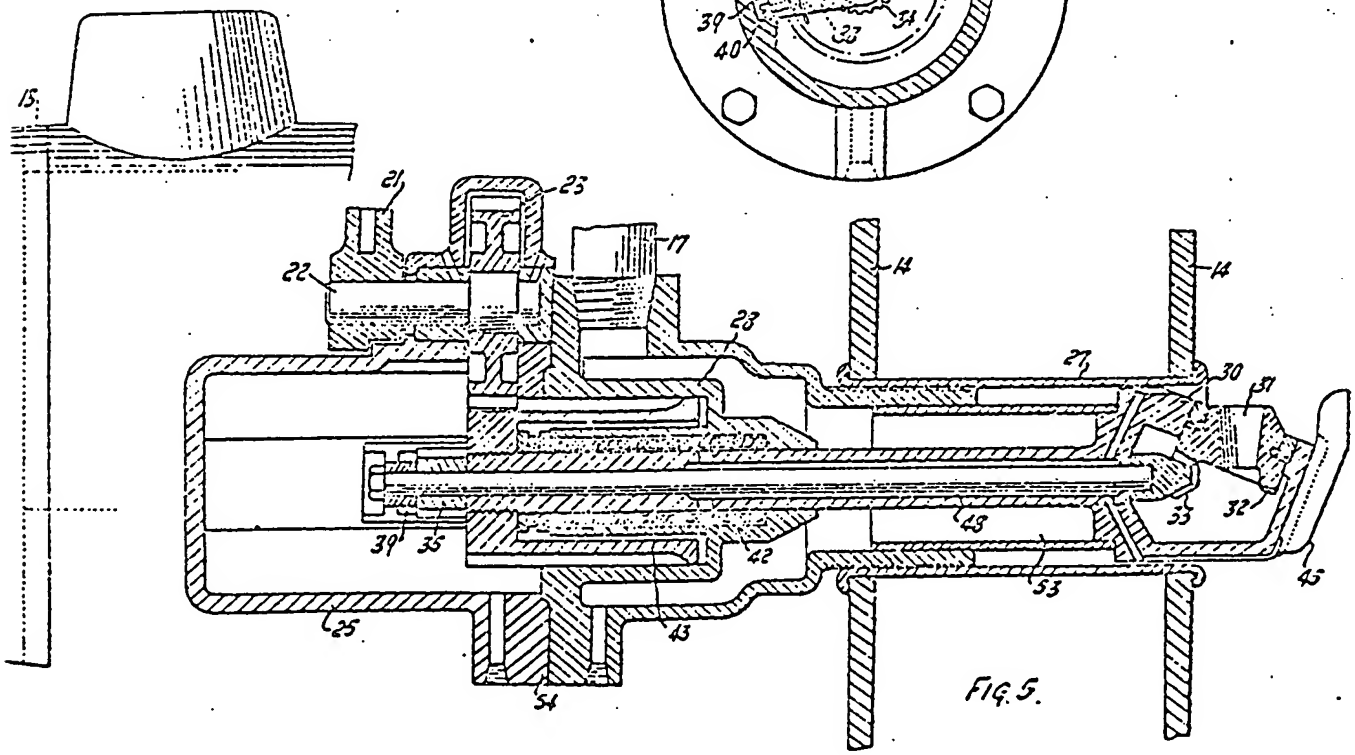

FIG. 5.

Charles & Read Ltd Photo Litho.